United States Patent [19]

Martinez

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[54] **INTERACTIVE TELEVISION AND DATA TRANSMISSION SYSTEM**

[75] Inventor: **Louis Martinez,** Cerritos, Calif.

[73] Assignee: **Radio Telcom & Technology, Inc.,** Cerritos, Calif.

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[58] **Field of Search** 358/84, 86, 141, 142, 358/145, 146, 147; 375/43, 61, 77; 455/47, 49, 51, 53, 57, 104, 109, 204

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Primary Examiner—James J. Groody
Assistant Examiner—Michael D. Parker
Attorney, Agent, or Firm—Blakely, Sokoloff, Taylor & Zafman

[57] **ABSTRACT**

A spread spectrum system provides bidirectional digital communication on a vacant television (TV) channel for simultaneous use by more than 75,000 subscribers using time and frequency division multiplex signals locked to horizontal and vertical sync pulses of an adjacent channel Host TV station. The system, whose operation is analogous to a radar system, comprises: (1) the Host TV station to send down-link sync and data pulses to subscribers during the horizontal blanking interval (HBI), (2) subscriber "transponders" which detect those signals and transmits up-link "echo" data pulses only during the HBI to eliminate interference to TV viewers, and (3) a central receiver which also uses the host TV sync pulses to trigger range gates to detect the up-link data pulses. In a preferred embodiment the central receiver employs directional antennas to determine direction to transponders and to define angular sectors partitioning the service area into pie-link "cells" which permit frequency re-use in non-contiguous sectors (like cellular radio). The system thus operates like a radar to measure elapsed time between receipt of TV sync pulses and receipt of transponder response pulses and measures bearing to transponders to thereby determine the location of fixed or mobile subscribers as well as provide data links to them. Transponders may share user's existing TV antenna or may operate on cable TV and could be packaged and "RF modems" for personal computers, as transceivers for mobile or portable use, or they may be integrated with a TV receiver to provide "interactive television".

63 Claims, 24 Drawing Sheets